REMARKS

Applicant appreciates the thorough examination of the present application that is evidenced in the Final Official Action of March 3, 2006 (the "Official Action"). Applicant particularly appreciates the withdrawal of the rejections in view of Beetz and Yonehara. Official Action, p. 6. Applicant respectfully requests reconsideration and withdrawal of the remaining rejections for at least the reasons explained below.

Status of the Claims

Claims 16-21 stand rejected under 35 U.S.C. § 103(a) as obvious in light of United States Patent No. 6,056,820 to Balakrishna *et al.* ("Balakrishna") in view of EP Application No. 0 962 963 to Uchida *et al.* ("Uchida"). Official Action, p. 2. Claims 11-14 stand rejected under 35 U.S.C. § 103(a) as obvious in light of Balakrishna in view of United States Patent No. 5,753,038 to Vichr *et al.* ("Vichr"). Official Action, p. 4.

Claims 16-21 Are Patentable Over Balakrishna and Uchida

Claim 16 recites as follows (emphasis added):

> 16. A method of producing a silicon carbide boule having a substantially single polytype, the method comprising:
>
> forcing nucleation sites on a surface of a silicon carbide seed crystal having the substantially single polytype to a predefined pattern; and
>
> growing the silicon carbide boule utilizing physical vapor transport (PVT) so as to provide selective preferential growth of silicon carbide on the silicon carbide seed crystal corresponding to the predefined pattern;
>
> wherein forcing nucleation sites comprises forming a pattern of material other than silicon carbide on a surface of the silicon carbide seed crystal thereby selectively exposing portions of the seed crystal to define the nucleation sites in the selectively exposed portions of the seed crystal;
>
> wherein the pattern of material other than silicon carbide provides a pattern of regions having a reduced sticking coefficient than that of the exposed portions of the seed crystal; and
>
> wherein the silicon carbide boule grows laterally above the material other than silicon carbide.

Applicant respectfully submits that Uchida and Balakrishna fail to teach at least the highlighted recitations, either alone or in combination.

The Official Action cites Example 8 of Uchida as teaching forcing of nucleation sites to a predefined pattern. Official Action, pp. 2-3. However, it should be noted that Example 8 of Uchida is not directed to forming a silicon carbide boule having a substantially single polytype on a surface of a seed crystal of the same polytype, as recited in Claim 16. In contrast, Example 8 of Uchida teaches the formation of "a silicon carbide substrate in which a 6H hexagonal silicon carbide crystal is disposed between 4H silicon carbide crystals." Uchida, par. [0089].

The Official Action cites the passage at col. 13, l. 55 to col. 14, l. 10 of Uchida as teaching growth of a same polytype material. Official Action, p. 3. However, the cited portion of Uchida appears to merely discuss process temperature differences that may result in the heteroepitaxial growth of 6H material on a 4H silicon carbide substrate. As far as Applicant can discern, Uchida does not teach growing a boule of silicon carbide having a substantially single polytype on a silicon carbide seed crystal of the same polytype using forced nucleation sites, as recited in Claim 16.

Moreover, while Uchida discloses using a "graphite plate or graphite sheet having a predetermined mask pattern," Uchida, para. [0090], it appears that the "graphite plate or sheet" of Uchida is used only to selectively grow heteroepitaxial regions of 6H polytype in preparation for step-flow growth of stacked 6H and 4H layers, and that the graphite plate or sheet is removed prior to growth of 4H and 6H material by step-flow growth. As stated therein:

> Following the above, the aforementioned pre-treatment substrate is introduced into a CVD growing chamber, and a normal step-flow growth is developed ... In other words, from the step edges of 4H or 6H, a 4H hexagonal silicon carbide crystal or a 6H hexagonal silicon carbide crystal is respectively grown, and a crystallization proceeds towards a direction of each inclined interface.

Uchida, para. [0091-0092]. Indeed, it appears that the "graphite plate or sheet" must be removed in order to permit step-flow epitaxial growth of both 4H and 6H regions from the step edges. That is, if the "graphite plate or sheet" of Uchida were not removed, there would appear to be no exposed 4H step edges from which to grow 4H crystals.

In sharp contrast, Claim 16 recites wherein the silicon carbide boule grows laterally above the material other than silicon carbide. The Office Action is silent on

these recitations, and does not explain how Balakrishna or Uchida discloses or suggests these recitations. If this rejection is maintained, Applicant respectfully requests that the Examiner distinctly identify the portions of Balakrishna or Uchida that teach that the silicon carbide boule grows laterally above the material other than silicon carbide.

In view of the foregoing, Applicant submits that Amended Claim 16 is patentable over Uchida and Balakrishna for at least these additional reasons.

Claims 17-21 are patentable over Balakrishna and Uchida at least per the patentability of Amended Claim 16. Accordingly, Applicant respectfully requests withdrawal of the rejection of Claims 16-21 over Balakrishna and Uchida.

Claims 11-14 Are Patentable Over Balakrishna and Vichr

Claim 11 recites as follows (emphasis added):

> 11. A method of producing a silicon carbide boule having a substantially single polytype, the method comprising:
>
> forcing preferential nucleation sites on a surface of a silicon carbide seed crystal having the substantially single polytype to a predefined pattern; and
>
> growing the silicon carbide boule utilizing physical vapor transport (PVT) so as to provide selective preferential growth of silicon carbide on the silicon carbide seed crystal corresponding to the predefined pattern;
>
> wherein forcing preferential nucleation sites comprises forming a pattern on the surface of the seed crystal so as to provide regions of the seed crystal which extend beyond other regions of the seed crystal; and
>
> wherein forming a pattern comprises forming a pattern of sidewalls in the exposed surface of the seed crystal; and
>
> wherein growing the silicon carbide boule comprises preferentially growing silicon carbide from the sidewalls.

Applicant respectfully submits that Uchida and Balakrishna fail to teach at least the highlighted recitations, either alone or in combination.

Citing col. 4, ll. 15-25 of Vichr, the Official Action states that Vichr teaches growth on the sidewalls of mesas, and that this teaching corresponds to preferentially growing on the sidewalls. Official Action, p. 5. Applicant respectfully disagrees. The cited passage of Vichr states that "the growth of the monocrystalline material initially proceeds with approximately the same growth rate on the top surfaces and the side walls of the mesas as well as the underlying surface of the seed plate." Vichr,

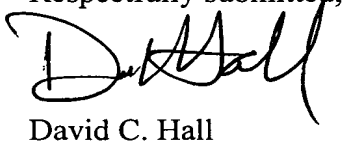
col. 4, ll. 19-22 (emphasis added). Applicant respectfully submits that this does not teach preferential growth on a sidewall, and in fact teaches away from the claimed preferential growth on a sidewall.

Applicant respectfully submits that neither Balakrishna nor Vichr discloses or suggests preferentially growing silicon carbide from sidewalls formed in an exposed surface of a seed crystal. Accordingly, Applicant submits that Claim 11 and Claims 12-14 that depend therefrom are neither disclosed nor suggested by Vichr and Balakrishna, either alone or in combination, and, therefore, requests withdrawal of the rejection.

CONCLUSION

In light of the above discussion, Applicant submits that the present application is in condition for allowance, which action is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



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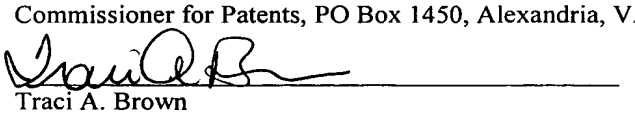

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